Upgrading to DN4 from DN3

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Upgrading to DN4 from DN3

Topic Overview

Woodhead Software and Electronics has developed the next generation (DN4) of hardware for the SST DeviceNet interface card line. This technical note provides a general overview of the DN4 platform and explains how to migrate to it.

About this Technical Note

This note is aimed at anyone developing a driver for the DN4 platform, but specifically those who are upgrading from DN3. It addresses the following topics:

- Migration issues

- Quick Comparison of DN3 and DN4 products

- Differences between the DN3 and DN4 hardware platform

- Hardware differences

Technical Support contact information is also provided.

Reference Documents

- R-1   717-0037___DN4 Boot Code User Guide.doc, Edition 1.0

Terms Used in this Document

Term	Description
DN3	DN3 hardware platform. For example: • SST-DN3-PCU • SST-DN3-104-2
.ss3	Executable firmware file compatible only with the DN3 hardware platform. For example: • DnScan.ss3 • Can2a.ss3
DN4	DN4 hardware platform. For example: • SST-DN4-PCU • SST-DN4-104-2
.ss4	Executable firmware, boot code, and/or FPGA binary files compatible only with the DN4 hardware platform. For example: DnScan.ss4 • Can2a.ss4 • FPGA.ss4

Quick Comparison Chart

Feature/Option	DN3	DN4
DN3-compatible register interface	-	Yes
HDR register value	0x40	0x40
Platform ID register	No	Yes
PCI ID	-	Same as DN3
Auto-Run Firmware Feature	Yes	Yes
Load .ss3	Yes	Yes (overridden by. ss4 on flash)
Load .ss4	No	Yes
Update FPGA	Yes	Yes
Update boot code	Yes	Yes
Update firmware on flash	Yes	Yes
DnScan	Yes	Yes
Can2a	Yes	Yes
Can2b	Yes	Yes
SST driver support	Yes	Yes

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Network Interface

Differences Between DN3 and DN4

Firmware

- The DN4 platform uses a new micro-processor and therefore requires a new .ss4 binary

- Any DN3 .ss3 firmware downloaded to the card will be ignored, and DN4 firmware stored in the card's flash shall be loaded instead. This shall work for Dnscan, Can2a and Can2b firmware. The .ss4 loaded from flash, and not the downloaded .ss3, shall be reported in shared RAM. For Dnscan, this will cause the Major Revision and Minor Revision in the DeviceNet Identity object to be reported differently on the wire.

- The firmware is ported from the latest version of DN3. For version details, see Appendix C. For DeviceNet performance comparisons, see Appendix D.

- Loading an .ss4 module to the DN4 platform works identically as loading an .ss3 module to the DN3 platform

- A new boot command process is used on the DN4 platform. Custom drivers can be updated to implement the new interface, enabling flash to be updated with boot code, FPGA and firmware modules, all encoded in the .ss4 format. For more information on interfacing via boot code, see document R-1.

Hardware Form Factor

- The DN4 platform cards shall match their DN3 counterparts with respect to the placement of SIP switches, DeviceNet connector and LEDs

- For detailed DN4 form factors, see Appendix A

- For more information on hardware electrical characteristics, see Appendix B

Hardware Register Interface

- All registers have the same behavior as DN3, with the exception of the new backward-compatible platform ID in the HostIrq register. For more information, see "Detecting the DN4 Hardware", below.

- As with DN3, the HDR register shall be reported as 0x40

Detecting the DN4 Hardware

- In the HostIrq register, bits 7-4 were previously reserved by DN3, DNP and DN products. This register will be used to detect the presence of DN4 hardware.

- Setting ID bit 7 (0x80) in the DN4 HostIrq register (offset 4) will expose the Platform ID in bits 7-4 on the following read to this register only

- To ensure backward compatibility with DN3 cards, any new driver should use the following steps when detecting the platform. Setting the Irq Level may be done as usual, prior to or after this procedure.

  1. Read the HostIrq register into a <temp> variable.

  2. Logically OR <temp> with 0x80.

  3. Write <temp> back to the HostIrq register.

  4. Immediately read the host register back into <temp>.

5. Logically AND <temp> with 0xF0.

- If <temp> is 0x00, the card is not DN4

- If <temp> is 0x10, the card is DN4

Register/Card	Bits							
HostIrq	7 R/W	6 R	5 R	4 R	3 R/W	2 R/W	1 R/W	0 R/W
DNP/ DN	0	0	0	0	0	0	0	0
DN3	0	0	0	0	Irq Level			
DN4	0	0	0	1	Irq Level			

Note

The ID bits (7-4) will only show up during the next read cycle to this register, after the IDs bits have been written. Subsequent reads shall only indicate the Irq Level.

- This register cannot distinguish between DN, DNP and DN3

Windows Operating System Support

- As DN4 is a drop-in replacement for DN3, the cards will show up in the operating system and be installed as DN3 cards

- A new Windows update will be available, but DN4 cards will work with older DN3 installs

- Dnscan32.dll has been updated with DN4 support. New to the API are:

  - DNS_UpdateFirmware(…), to save a file to the card's flash

  - DNS_UploadFirmware(…), to retrieve a file from the card's flash

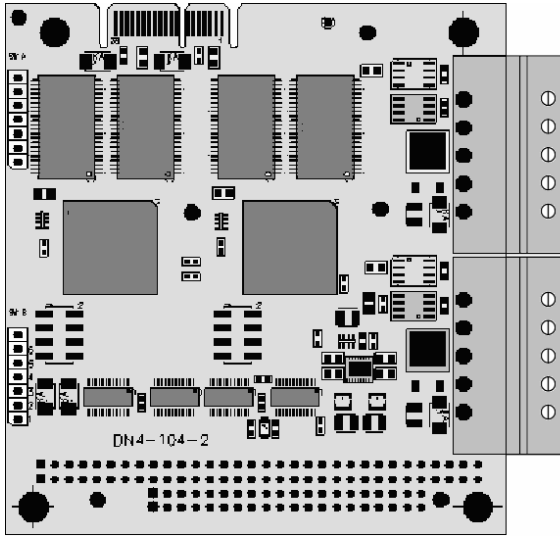 - DNS_DetectNIOSCard(…), to detect whether the installed card is DN4

Note

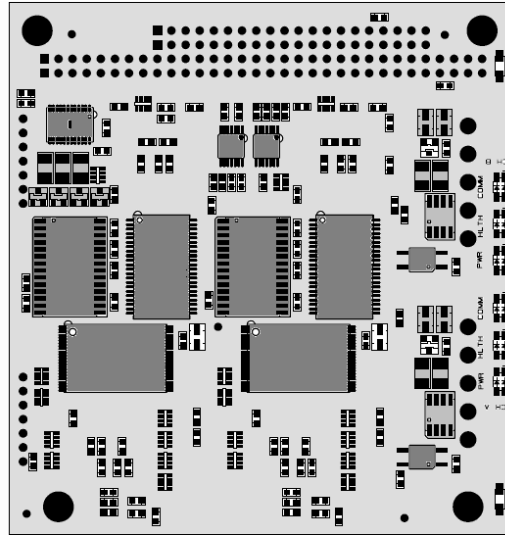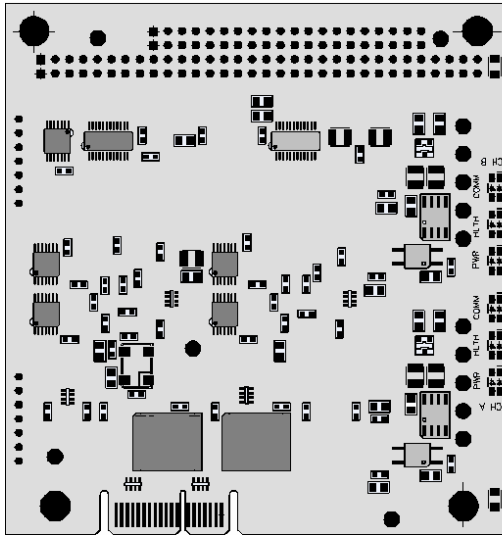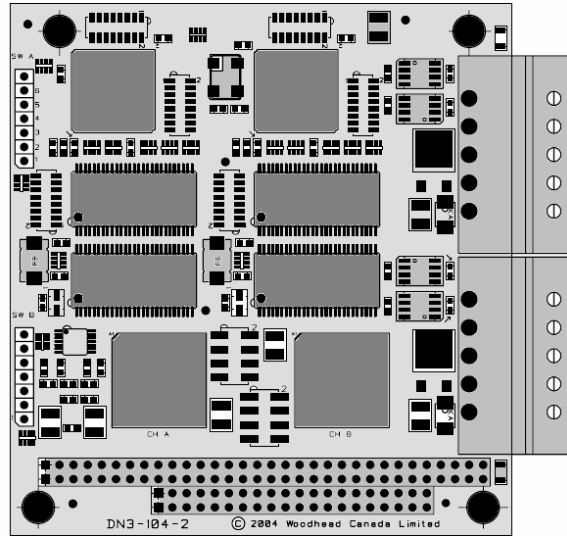Each of the above functions can only be used when the card is closed.

Appendix A – DN4 Hardware Form Factors

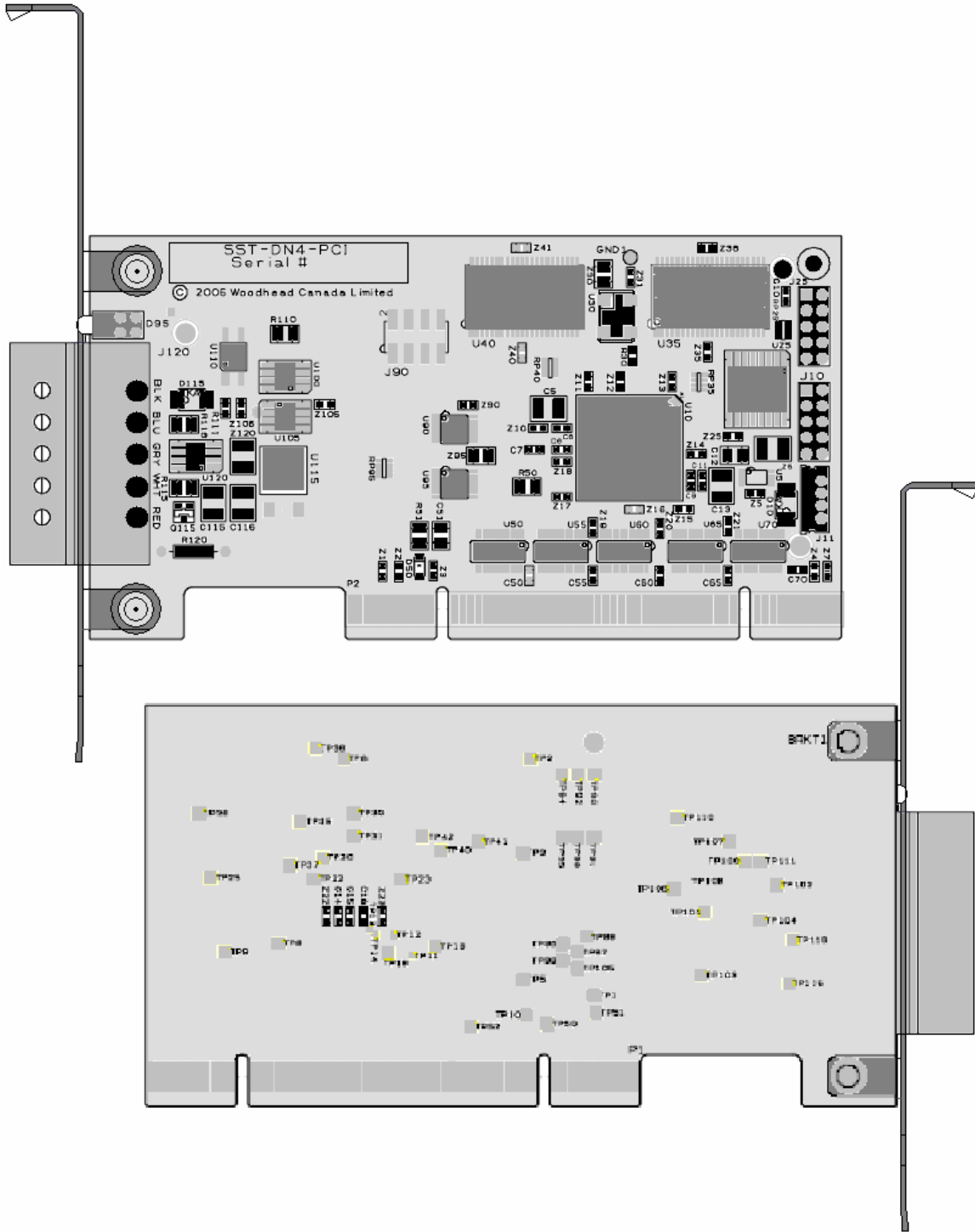**DN4-104-2**   **DN3-104-2**

Network Interface

DN4-PCI-1 Half-Height – Full-Height Bracket

Appendix B – Electrical Characteristics Comparison

104-2 Card

Attribute	DN3	DN4
Storage Temperature	-40ºC to +85ºC	-40ºC to +85ºC
Operating Temperature	0ºC to +55ºC	0ºC to +55ºC
Humidity	5% - 95% non-condensing	5% - 95% non-condensing
Network Power	11-24V DC, 50mA (typical)	11-24V DC, 50mA (typical)
Network Isolation	500V	500V
Voltage Requirements	5V	5V
Typical Current Draw	900mA	< 900mA (actual draw TBD)

PCI Half-Height Card

Attribute	DN4
Storage Temperature	-40ºC to +85ºC
Operating Temperature	0ºC to +55ºC
Humidity	5% - 95% non-condensing
Network Cable	Shielded Twisted pair
Network Power	11-24V DC, 50mA (typical)
Network Isolation	500V
Voltage Requirements	5V and 3.3V
Typical Current Draw	350mA

Network Interface

Appendix C – Flashed Firmware Version History

DnScan

Version	Changes
4.1.6.0	• Startup LED flash no longer blocks firmware startup In Module Header, time from firmware load to 'DN' in ModuleType is now approx 500ms.
4.1.5.0	• Keep Network Status LED solid red after a bus off condition, even after taken offline. • Connection object now returns "object does not exist" error if COS/Cyclic connection is not configured. • Do not send a COS message if waiting for a previous acknowledge
Ported from DN3, version 3.14.1	N/A

Can2a

Version	Change
2.6.2.0	• Startup LED flash no longer blocks firmware startup. In Module Header, time from firmware load to 'DN' in ModuleType is now approx 500ms.
2.6.1.0	DN4 port. No functionality change.
Ported from DN3, version 2.5.4.0	N/A

Can2b

Version	Change
1.2.3.0	• Startup LED flash no longer blocks firmware startup. In Module Header, time from firmware load to 'DN' in ModuleType is now approx 500ms.
1.2.2.0	DN4 port. No functionality change.
Ported from DN3, version 1.0.1.0	N/A

Appendix D – Technical Support

Technical support is available during regular business hours by telephone, fax or email from any Woodhead Software & Electronics office, or from www.woodhead.com. Documentation and software updates are also available on the website.

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